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CASE REPORT

An autopsy case of right ventricular cardiac metastasis from squamous cell carcinoma of the left hand

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KEYWORDS

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Abstract We here report a 60-year-old woman in whom autopsy revealed a metastasis in the right cardiac ventricle from a well-differentiated squamous cell carcinoma (SCC) of the left hand. The tumors in the myocardium and left hand were both well-differentiated SCCs with keratinization and sporadic keratin pearls. High concentrations of heart failure markers together with a pericardial effusion suggested antemortem chronic heart failure. Our case is particularly unusual because there were no regional lymph node metastases and the cardiac metastasis was not one of multiple metastases; thus, hematogenous metastasis to the right side of the heart alone had occurred.

1. Introduction

Squamous cell carcinoma (SCC) results from malignant growth of epidermal keratinocytes[1] and can metastasize; however, there are few published case reports of metastatic cutaneous SCC to the heart. In the present report, we describe a medicolegal autopsy case of a metastasis from a cutaneous SCC to the heart.

2. Case report

We here report a case of a 60-year-old woman who lived with her husband and second son. Around 11:30 one morning, her husband found her dead in a supine position on the floor beside her bed. She had last been seen entering her bedroom around midnight. Because postmortem rigidity had already developed, she was not taken to an emergency department.

According to the police, the patient's left hand had suddenly started to swell approximately 2 years previously. She

Abbreviations: SCC, squamous cell carcinoma

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had been bandaging this hand for about 1 year and had never shown any family members the affected area. Although she had been unable to move her left arm for 1 month because of pain, she had continued to perform household tasks using only her right hand.

An autopsy was performed the following day to determine the cause of death.

3. Autopsy findings

The patient's height was 148 cm and her weight 38 kg. There was no evidence of trauma or fracture. There was severe necrosis and swelling of the left hand that did not extend beyond the wrist (Fig. 1A) in which a white tumor with necrosis was visible (Fig. 1B). Her left index finger had fallen off and was not available.

There was approximately 130 mL of a pale yellow transparent fluid in the pericardial cavity with no evidence of cancerous pericarditis. The volume of intracardiac blood was approximately 120 mL; it was dark red, liquid, and contained a few soft blood clots. The heart weighed 272.7 g and contained a 6.5 × 7.5 × 2.9 cm white plate-like tumor extending from the anterior to the lateral aspect of the right ventricle and projecting into the right ventricular cavity (Fig. 2A –C). There was no obvious tumor infiltration of the conducting system of the heart. There was mild coronary arteriosclerosis in the left anterior descending artery. No myocardial necrosis, fibrosis, or any lesions other than the tumor were observed on the cut surface of the myocardium.

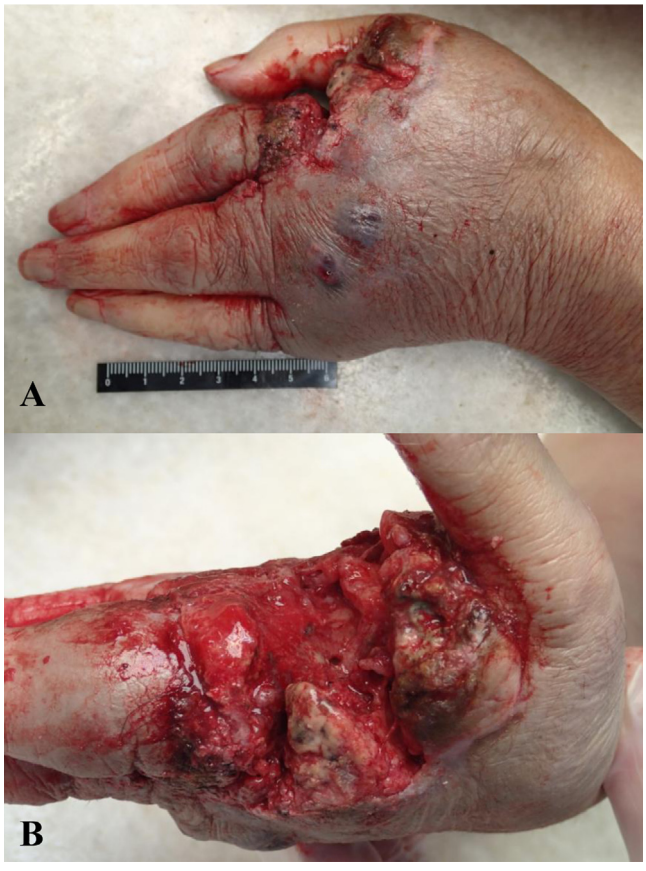

Figure 1 (A) Photograph of dorsum of the hand showing necrosis and swelling. (B) Photograph of dorsum of the hand showing an exposed white tumor.

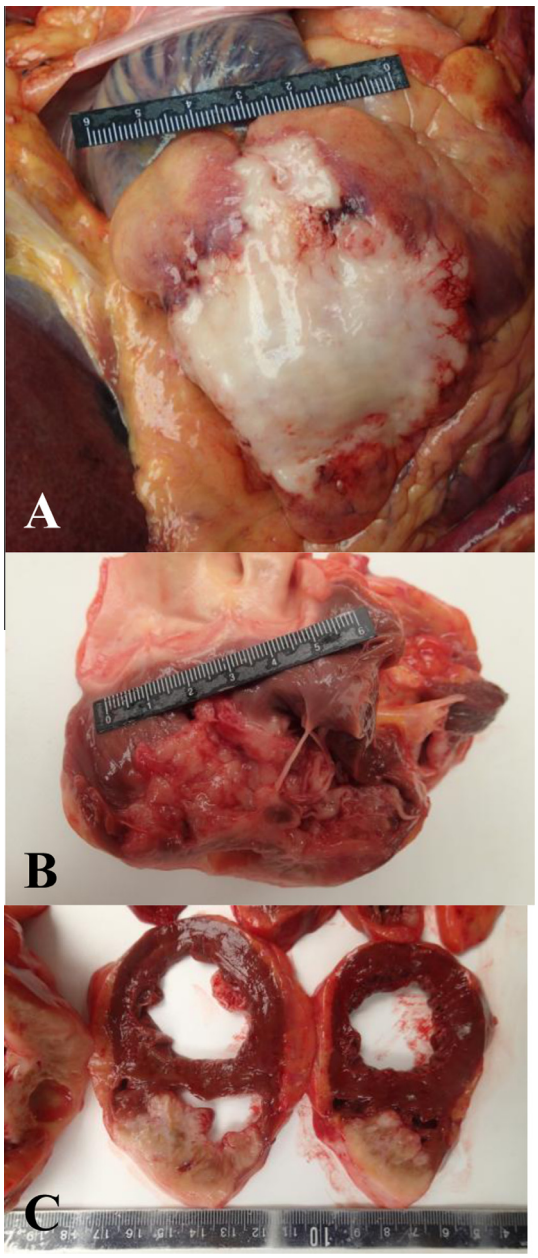

Figure 2 Heart: macroscopic findings. (A) A 6.5 × 7.5 cm white, plate-like tumor extending from the anterior to the lateral aspect of the right ventricle is visible. (B) The tumor is exposed to the lumen of the right ventricle. (C) The cut surface of the myocardium shows a white solid tumor.

The airways were empty and the airway mucosa was pale without petechiae. The left and right lungs weighed 271.6 and 353.7 g, respectively. Congestive edema was observed; however, no pneumonia was detected.

No significant gross or histological changes were noted in any other organs. In particular, there were no palpably enlarged lymph nodes and no evidence of distant metastasis to areas other than the myocardium. Gastric contents consisted of approximately 15 mL of reddish brown fluid.

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The tumors in the myocardium and left hand were both well-differentiated SCCs with keratinization and sporadic cancer pearls (Fig. 3A and B). Although the cancer had extended into the epicardium, it was covered by fibrous tissue (Fig. 4A). Some fibrin was adhering to the endocardial surface of the tumor (Fig. 4B). Although the tumor viability was high overall, some necrotic foci were observed (Fig. 4C).

3.1. Postmortem laboratory studies

The alcohol concentration in femoral vein blood was 0.02 mg/mL; thus, the subject was not intoxicated at the time of death. Pericardial fluid concentrations of the markers of heart failure, brain natriuretic peptide (BNP) and N-terminal pro-BNP (NT-proBNP), were high at 311 pg/mL (normal < 18.4 pg/mL) and 33,700 pg/mL (normal < 125 pg/mL), respectively.

3.2. Conclusions from autopsy findings

There was no evidence of a cause of death in any organs other than the heart. The pericardial effusion and its high concentrations of heart failure markers suggested antemortem chronic heart failure caused by myocardial metastasis. Based on the above autopsy findings, we determined that the cause of death was metastasis of well-differentiated SCC from the left index finger of the left hand to the cardiac muscle of the right ventricle.

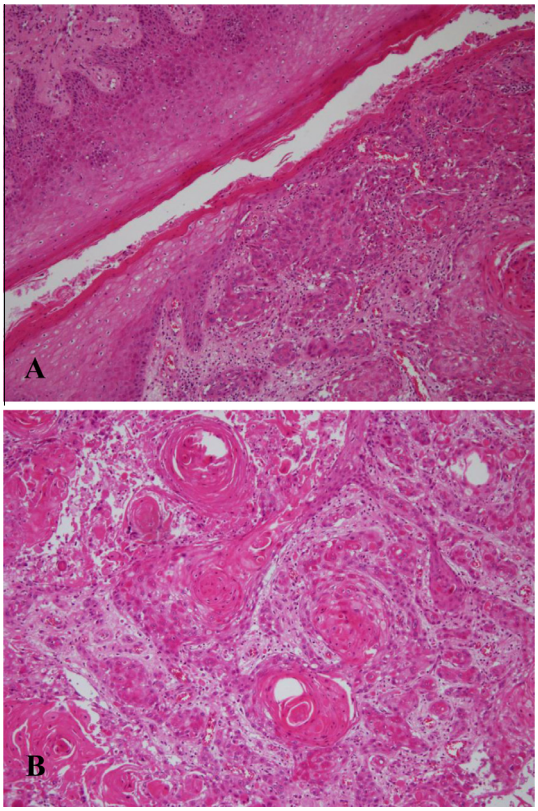

Figure 3 (A) Photomicrograph of the skin tumor showing well-differentiated squamous cell carcinoma accompanied by cancer pearls. (B) Photomicrograph of the cardiac tumor showing well-differentiated squamous cell carcinoma exhibiting the same histological features as that observed in the primary skin lesion.

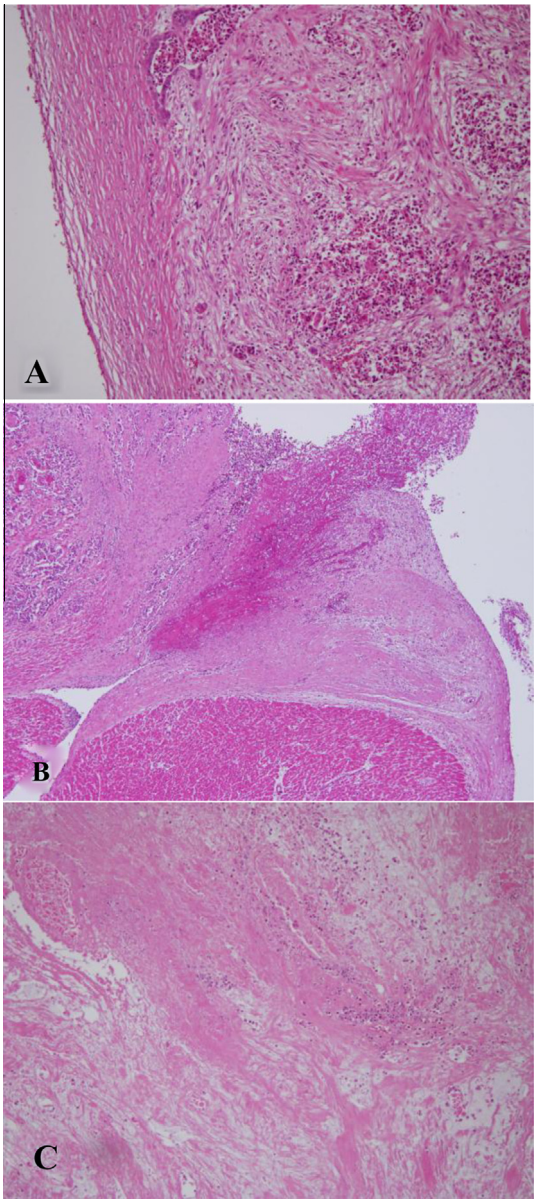

Figure 4 (A) Fibrotic tissue covers the epicardial surface of the tumor. (B) Fibrin is adherent to the endocardial surface of the tumor. (C) The tumor contains necrotic foci.

4. Discussion

SCC results from malignant growth of epidermal (mucous membrane) keratinocytes; its component cells show variable squamous differentiation.[1] It often arises from metaplastic squamous epithelium, such as in the bronchus or uterine cervix, and is often preceded by scars or precancerous conditions. When originating in the skin, it characteristically presents as a hard nodule in a site exposed to light.[2] SCCs may necrotize or ulcerate, which can be accompanied by a foul odor.

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Histologically, keratinization of individual cells and keratin pearls are present in SCCs. The amount of keratinization decreases with increasing malignancy and lack of differentiation.

Distant cardiac metastases from primary cancers in organs relatively close to the heart, including the lung, esophagus, and breast, or as infiltrations from hematologic malignancies, have been reported.[3,4] The most common primary focus is reportedly the lung (36.4%).[5] Metastasis from an epithelial tumor in a relatively distant area, such as the hand, as occurred in our patient, is rare. When malignant tumors metastasize to the heart, they primarily involve the epicardium and less commonly the endocardium or myocardium.[5] According to Klatt et al. metastasis to the heart was observed in 10.7% of 1029 autopsy cases diagnosed with malignant tumors, 75.5% of which involved the epicardium. Metastasis of SCC to the heart was observed in only three cases in that series.[5]

As to primary skin malignancies, there are several reports of metastatic malignant melanoma in the myocardium[6]; however, there are only a few published case reports of metastatic SCC to the heart.[7–10] A search of the database of pathological findings of autopsies in Japan developed by the Japanese Society of Pathology[11] revealed 74 cases of SCC of the skin metastatic to the heart among 907,614 autopsy reports between 1981 and 2012. This database includes 3788 cases of skin cancer and 808 of SCC. All 74 cases of skin cancer that had metastasized to the heart also had non-cardiac metastases; no cases of metastasis to the heart alone, as in our patient, were recorded. Thus, our case is unusual in two respects: no metastases other than the single cardiac metastasis were identified and hematogenous metastasis to the heart alone had occurred in the absence of regional lymph node or other distant metastases.

Prichard et al. have proposed that the following four factors are responsible for the rarity of metastasis to the heart: (i) the strong kneading action of the myocardium; (ii) the metabolic peculiarities of the myocardium; (iii) the fast blood flow within the heart; and (iv) lymph flow normally recedes from the heart.[12]

Metastatic tumor can reach the heart via four pathways: hematogenous spread, lymphatic spread, transvenous extension, and direct extension.[13,14] We believe that hematogenous spread had occurred in our case because: (i) the tumor involved the endocardium and was projecting into the right ventricular cavity, although this was possibly simply because the lesion was so bulky; (ii) the epicardial aspect of the cancer was covered by fibrous tissue; and (iii) the autopsy revealed no lymph node metastases. Of note, the cancer had metastasized to the right side of the heart, which is the first to receive venous blood returning from the left hand.

Ethical approval

None declared.

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None.

Conflict of interest

None.

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